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**ABSTRACT**

A node in a wireless network includes at least first and second directional antennas, which are directed toward other nodes in the network. Signal generation circuitry at the node receives first and second streams of digital information to be conveyed to the other nodes, and combines the streams so as to generate outgoing signals for transmission by the first and second directional antennas, while suppressing interference between the transmitted signals. Additionally or alternatively, processing circuitry at the node receives first and second receiver inputs from the antennas, due to reception of incoming signals by the antennas from the other nodes, and combines the inputs so as to extract data streams therefrom while suppressing interference between the received signals.